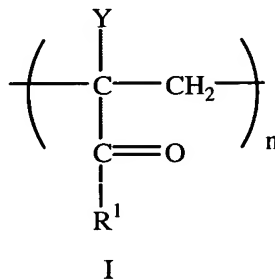


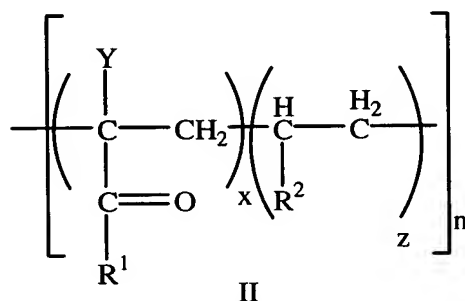
## WHAT IS CLAIMED IS:

1. A limited play optical storage medium for data, comprising:
  - a) a first substrate;
  - b) a reflective layer;
  - c) a data layer disposed between said substrate and said reflective layer;
  - d) a reactive layer comprising at least one carrier; and at least one reactive material; and
  - e) an optically transparent second substrate with an oxygen permeability in a range between about 0.1 Barrers and about 1.35 Barrers at 25°C wherein the second substrate is disposed between the reactive layer and a laser incident surface, wherein the second substrate comprises a polymethacrylate copolymer, or a blend comprising a polymethacrylate homopolymer or copolymer.
2. The limited play optical storage medium in accordance with Claim 1, wherein the second substrate has a glass transition temperature of at least about 100°C.
3. The limited play optical storage medium in accordance with Claim 2, wherein the second substrate comprises structural units corresponding to structure (I):



wherein Y is hydrogen, a C<sub>1</sub>-C<sub>12</sub> alkyl group, a C<sub>4</sub>-C<sub>10</sub> aryl group, R<sup>1</sup> is C<sub>1</sub>-C<sub>12</sub> alkoxy group, and n is an integer from 1 to 10000.

4. The limited play optical storage medium in accordance with Claim 3, wherein the second substrate comprises structural units corresponding to structure II



wherein Y is hydrogen, a C<sub>1</sub>-C<sub>12</sub> alkyl group, a C<sub>4</sub>-C<sub>10</sub> aryl group; R<sup>1</sup> is C<sub>1</sub>-C<sub>12</sub> alkoxy group; R<sup>2</sup> is C<sub>4</sub>-C<sub>10</sub> aryl group, C<sub>1</sub>-C<sub>12</sub> alkoxy group, cyano, nitro, or halogen; x and z are independently integers from 1-10000; and n is an integer from 1 to 10000.

5. The limited play optical storage medium in accordance with Claim 1, wherein said first substrate is a thermoplastic.

6. The limited play optical storage medium in accordance with Claim 5, wherein said thermoplastic has a glass transition temperature of at least 100°C.

7. The limited play optical storage medium in accordance with Claim 6, wherein said thermoplastic is selected from the group consisting of polyvinyl chloride, polyolefins, polyesters, polyamides, polysulfones, polyimides, polyetherimides, polyether sulfones, polyphenylene sulfides, polyether ketones, polyether ether ketones, ABS resins, polystyrenes, polybutadiene, polyacrylates, polymethacrylates, polyacrylonitrile, polyacetals, polycarbonates, polyphenylene ethers, ethylene-vinyl acetate copolymers, polyvinyl acetate, liquid crystal polymers, ethylene-tetrafluoroethylene copolymers, aromatic polyesters, polyvinyl fluoride, polyvinylidene fluoride, polyvinylidene chloride, tetrafluoroethylene, and mixtures, copolymers, reaction products, and composites comprising at least one of the foregoing thermoplastics.

8. The limited play optical storage medium in accordance with Claim 7, wherein said thermoplastic comprises polycarbonate.

9. The limited play optical storage medium in accordance with claim 1, wherein the reflective layer comprises a metal.

10. The limited play optical storage medium in accordance with claim 9, wherein the metal comprises aluminum, silver, gold, titanium, alloys, or combinations thereof.

11. The limited play optical storage medium in accordance with claim 1 wherein said data layer is embossed upon a surface of said first substrate.

12. The limited play optical storage medium in accordance with claim 11 wherein said data layer comprises pits and land.

13. The limited play optical storage medium in accordance with Claim 1, wherein said reactive material is an oxygen sensitive dye.

14. The limited play optical storage medium in accordance with Claim 13, wherein said oxygen sensitive dye is selected from the group consisting of leuco methylene blue, reduced forms of methylene blue, brilliant cresyl blue, basic blue 3, and toluidine 0.

15. The limited play optical storage medium in accordance with Claim 13 wherein the oxygen sensitive dye is leuco methylene blue.

16. The limited play optical storage medium in accordance with Claim 1, wherein said carrier is at least one material selected from the group consisting of thermoplastic acrylic polymers, polyester resins, epoxy resins, polythiolenes, UV curable organic resins, polyurethanes, thermosettable acrylic polymers, alkyds, vinyl resins, and reaction products thereof.

17. The limited play optical storage medium in accordance with Claim 16, wherein said carrier comprises a thermoplastic acrylic polymer.

18. The limited play optical storage medium in accordance with Claim 15, wherein said carrier comprises polymethylmethacrylate.

19. The limited play optical storage medium in accordance with Claim 1, wherein said reactive layer comprises polymethylmethacrylate and leuco methylene blue.

20. The limited play optical storage medium in accordance with Claim 1, wherein said reactive layer comprises a UV curable organic resin.

21. The limited play optical storage medium in accordance with Claim 20, wherein the UV curable organic resin comprises cross-linked acrylic resins.

22. The limited play optical storage medium in accordance with Claim 1, wherein the second substrate further comprises an additive wherein the additive substantially increases the oxygen permeability of the second substrate.

23. The limited play optical storage medium in accordance with Claim 22, wherein the additive comprises at least one member of the group consisting of antiplasticizers, pigments, mold release agents, thermal stabilizers, ultraviolet absorbers, and oxygen scavengers.

24. A limited play optical storage medium for data, comprising:

- a. a first substrate;
- b. a reflective layer;
- c. a data layer disposed between said substrate and said reflective layer;
- d. a reactive layer comprising at least one carrier; and at least one reactive material; and
- e. an optically transparent second substrate comprising a an olefin polymer selected from the group consisting of methyl methacrylate-styrene-acrylonitrile terpolymers, and methyl methacrylate-styrene-ethyl acrylate terpolymers, said olefin polymer having an oxygen permeability in a range between about 0.2 Barrers and about 1.2 Barrers at 25°C, wherein the second substrate is disposed between the reactive layer and a laser incident surface.

25. A limited play optical storage medium for data, comprising:
- a. a first substrate consisting essentially of polycarbonate, said polycarbonate having a  $T_g$  greater than about 100°C;
  - b. a reflective layer consisting essentially of aluminum;
  - c. a data layer disposed between said substrate and said reflective layer, said data layer comprising pits and land embossed upon a surface of said polycarbonate;
  - d. a reactive layer comprising poly(methyl methacrylate) and leuco methylene blue;
  - e. an optically transparent second substrate comprising a an olefin polymer selected from the group consisting of methyl methacrylate-styrene-acrylonitrile terpolymers, and methyl methacrylate-styrene-ethyl acrylate terpolymers, said olefin polymer having an oxygen permeability in a range between about 0.2 Barrers and about 1.2 Barrers at 25°C, wherein the second substrate is disposed between the reactive layer and a laser incident surface.